REPORT ON THE INVESTIGATION OF SUBSURFACE PETROLEUM CONTAMINATION D & C TRANSPORTATION, INC. ORLEANS, VERMONT

October, 1991

Prepared for:

D & C Transportation, Inc.
32 Railroad Avenue
Orleans, VT 05860

Prepared by:

Griffin International
2B Dorset Lane
Williston, Vermont 05495
(802) 879-7708

sample wells to make
sure p.c. is declining
sample sediment along
Barton River ~
3 spots

TABLE OF CONTENTS

1.0 INTRODUCTION

This report details the investigation of subsurface petroleum contamination at the D & C Transportation company's garage in Orleans, Vermont. The investigation has been conducted by Griffin International, Inc. (Griffin) for D & C Transportation, Inc. (D & C). D & C was the owner of the underground storage tanks (USTs) which are the suspected sources of the contamination. The Vermont Department of Environmental Conservation (DEC) Hazardous Materials Management Division's (HMMD) Sites Management Section (SMS) requested this investigation be conducted in response to the discovery of subsurface petroleum contamination at the site on May 1, 1991.

In a letter to Fredric Oeschger, President of D&C, dated 19 June 1991, the Vermont State SMS requested that the following determinations regarding the contamination be made as part of a limited site assessment:

1. Define the degree and extent of soil and groundwater petroleum contamination at the site.

2. If necessary, develop a remedial plan to treat the residual subsurface contamination.

3. Develop a long term monitoring program to track the contamination over time.

Griffin International has completed the State requested site assessment using a work plan submitted to and approved by the Vermont SMS. Following are the results of this investigation.

2.0 SITE BACKGROUND

2.1 Site description

The site sits on the flood plain of the Barton River, abreast of a meander in the river channel (see map) and about one and one quarter miles south of the confluence of the Willoughby River. The Barton River flows north to Lake Memphremagog and from there to the St. Lawrence River. The flood plain along this stretch of river is about one quarter mile wide.

2.2 Site History

On 1 May 1991, one 10,000 gallon diesel UST and one 4,000 gallon gasoline UST were excavated for replacement and lifted from their pits by D&M Sanville excavators. Lee's Oil Service of Haverhill, N.H. purged, cleaned, removed, and

disposed of the tanks. All contaminated soils from the excavation were stored on-site on polyethylene. Lee's Oil Service has stated that they have subsequently removed the contaminated soils from the site, and delivered them to an asphalt plant for recycling. Oversight services of the tank removal were provided by Griffin International.

Inspection of the cleaned 10,000 gallon diesel tank indicated no leaks from holes in the tank but possibly from a connection in the piping which lead to the fuel pump. Similar inspection of the 4,000 gallon 'unleaded' tank revealed severe pitting in the bottom of the tank; a possible cause of a leak, or leaks, in that tank.

Soils surrounding the former Diesel tanks were screened with a photoionization device (PID) and found to contain concentrations of hydrocarbon vapors ranging from 160 to 200 parts per million (ppm). Soils surrounding the gasoline tank were similarly screened and yielded PID readings of between 180 and 260 ppm. No free product was observed in either tank pit however, water in each pit exhibited a petroleum sheen. Approximately 120 cubic yards of contaminated soils were removed from the tank pit and stockpiled on-site pending removal to the asphalt plant.

3.0 INVESTIGATIVE PROCEDURES

3.1 Monitoring Well Installation

To help determine the degree and extent of soil contamination at the site, four monitoring wells were completed by Green Mountain Boring under the supervision of a Griffin hydrogeologist (see site map, Appendix A). This work was completed on 26 August 1991.

The wells were installed using a hollow-stem auger drill rig. Undisturbed soil cores were collected from each borehole, at five foot intervals, using a split spoon sampler. Split spoon corings and drill cuttings collected directly from the augers were logged by the hydrogeologist and screened for volatile organic compounds (VOCs) using a portable photoionization detector (PID). Soils encountered at the four boreholes consisted of stratified, silty sands and clays with occasional gravel lenses. Elevated PID readings were observed in soils from two of four wells. VOC concentrations and soil characteristics are listed on the detailed well logs in appendix B.

The wells are constructed of two inch diameter well screen and casing. The annulus between the borehole wall and the screened section of each well contains a silica gravel pack to filter fine sediments from the well. The annulus of each well also contains a bentonite seal to prevent surface water

from infiltrating into the borehole. Each well is protected at the surface by steel, flush mounted well head protection casings and bolt down cover. Well construction details are listed on the well logs in appendix B.

All wells were located in the presumed, downgradient direction from the underground storage tanks to help define the degree and extent of the projected contaminant plume.

Once the wells were installed they were developed by a Griffin Hydrogeologist using a clean Teflon bailor.

3.2 Determination Of Groundwater Flow Direction and Gradient

On 29 August 1991, Griffin measured the relative water table elevations in each of the four on-site monitoring wells. Measurements were made relative to a benchmark (top of casing at MW4), which was assigned an arbitrary elevation of 100 feet. Liquid level data is presented in Appendix C.

The water table surface was calculated using the water level measurements from each of the four monitoring wells (see groundwater contour map, Appendix C). As expected, groundwater in the area of the former USTs was determined to be flowing to the northwest, toward the Barton River, at a gradient of 11%.

3.3 Groundwater Sampling and Analysis

On 29 August 1991, Griffin collected groundwater samples from each of the four on-site monitoring wells for analysis for VOCs by EPA method 8020. Equipment, trip blank and duplicate samples were also collected. Results of the Laboratory analyses are summarized below. Laboratory report forms are contained in Appendix D.

Parameter	**MW-1**	**MW-2**	**MW-3**	**MW-4**
Benzene	360	385	875	765
Chlorobenzene	6.07	ND	ND	11.8
1,2 DCB	ND	ND	ND	2.19
1,3 DCB	ND	ND	ND	ND
1,4 DCB	ND	ND	ND	ND
Ethylbenzene	192	69.0	213	217
Toluene	32.5	208	468	435
Xylenes	679	301	1,040	1,010
MTBE	71.0	268	729	959

3.4 River Bank Inspection

On all three dates that Griffin personnel visited the site (tank pull, well installation and well sampling) the river bank along the edge of the D & C property was visually examined for petroleum contamination. No contamination of the river, or river banks, was detected during these inspections.

4.0 CONCLUSIONS

Based on the above investigation of subsurface petroleum contamination at the D & C transportation company's garage in Orleans, Griffin has arrived at the following conclusions:

1. There was a release or releases of gasoline to the subsurface in the vicinity of the former UST locations. The source of the release has not been positively identified but it is likely that the former USTs and/or associated underground piping were involved due to the presence of the petroleum sheen on the water in the pits, the elevated PID readings taken from the soils surrounding the tanks and VOCs found in groundwater samples collected downgradient of the tank pits. The amount and duration of the release(s) are unknown.

2. The release resulted in contamination of soils immediately surrounding the tanks in the tank pit. Most of these soils were excavated during tank removal and subsequently removed from the site.

3. The release additionally resulted in contamination of groundwater beneath, and downgradient of, the former USTs as evidenced by the presence of VOCs in the downgradient monitoring wells as determined by lab analysis

4. Removal of the USTs has likely eliminated the source of contamination. Removal of much of the contaminated soils has probably significantly reduced the source strength of the residual contamination.

5. The soils beneath the former D & C USTs consist of silty sands and clays with imbedded gravel lenses. Depth to water table ranges from approximately seven feet at MWs 3 and 4 to eleven feet at MW 1. The water table slopes to the northwest at a gradient of about 11%. Due to the steep water table gradient and sand and gravel lenses groundwater flow rate is estimated to be relatively high.

6. Based on groundwater flow and VOC concentrations in downgradient wells, it is possible that contamination is entering the river.

5.0 RISK ASSESSMENT

Based on the results of this assessment it would appear that groundwater contamination has occurred below, and downgradient of the former USTs. There appear to be no private or public water supplies or other sensitive receptors in the path of the apparent contaminant plume between the tank pits and the Barton River.

The Barton River itself is a possible receptor of petroleum contaminants as they migrate down-gradient on the water table and slowly diffuse into the River.

The Town of Orleans water supply system is fed from a well in the Willoughby River flood plain, a separate river valley, one mile to the northeast (see map). This well is about three quarters of a mile above the confluence with the Barton River. Given this location, it should not be at risk.

6.0 RECOMMENDATIONS

Based on the above conclusions, we present the following recommendations regarding the subsurface petroleum contamination at the site:

1. A fifth well should be installed upgradient of the tank pits to provide a sampling source from which to confirm that some portion of the contaminants are not migrating from another, upgradient source.

2. A sixth well should be installed further downgradient from the former UST pits, near the River's edge, to provide a sampling source from which to better define the degree and extent of downgradient plume migration. This would provide information on the concentration of contaminants near the river's edge for future use in evaluating the risk to the river.

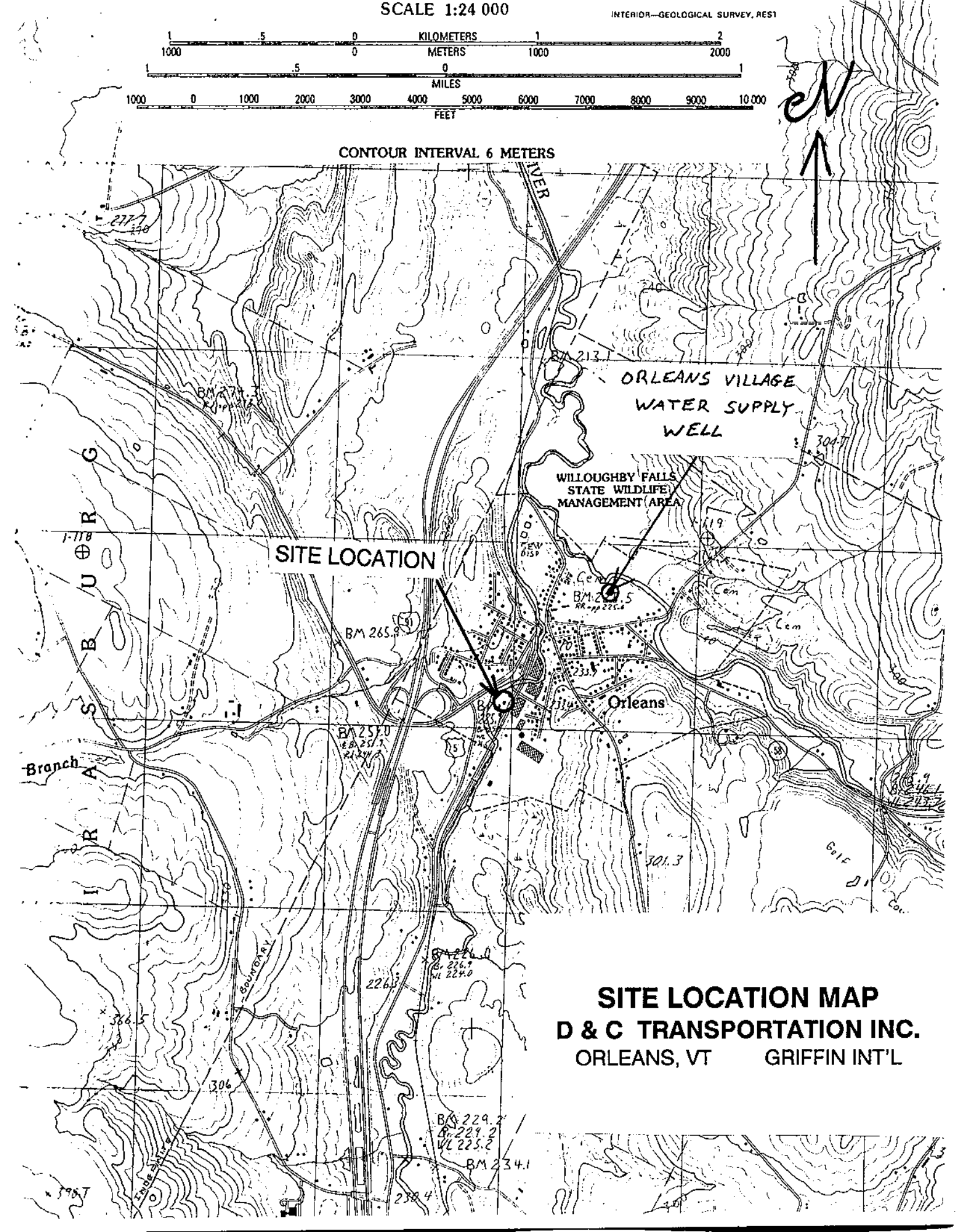
3. The four existing monitoring wells should be resampled and tested for VOCs by EPA method 8020 to verify the results of the initial sampling. At the time of this resampling, the two additional wells should be sampled and analyzed to EPA Method 8020 to provide groundwater quality data at these locations.

4. The river bank, at the point of projected plume intersection with the river, should be regularly inspected for obvious petroleum seeps.

5. After steps 1-4 have been accomplished, a determination should be made as to whether further action should be taken.

6. No water supply wells should be installed within the affected area of the property.

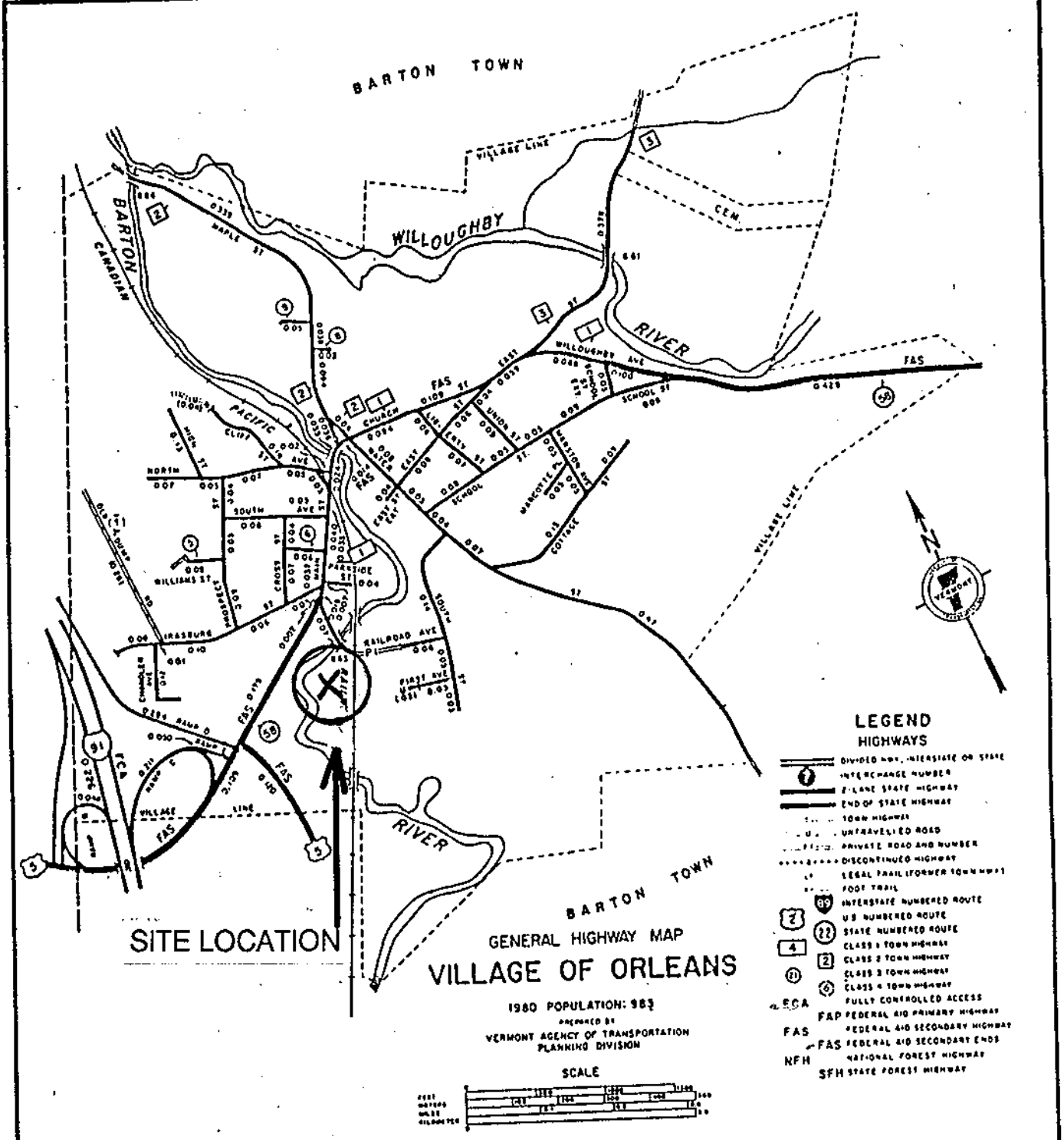
APPENDIX A



SITE LOCATION MAP

D & C TRANSPORTATION INC.

ORLEANS, VT GRIFFIN INT'L

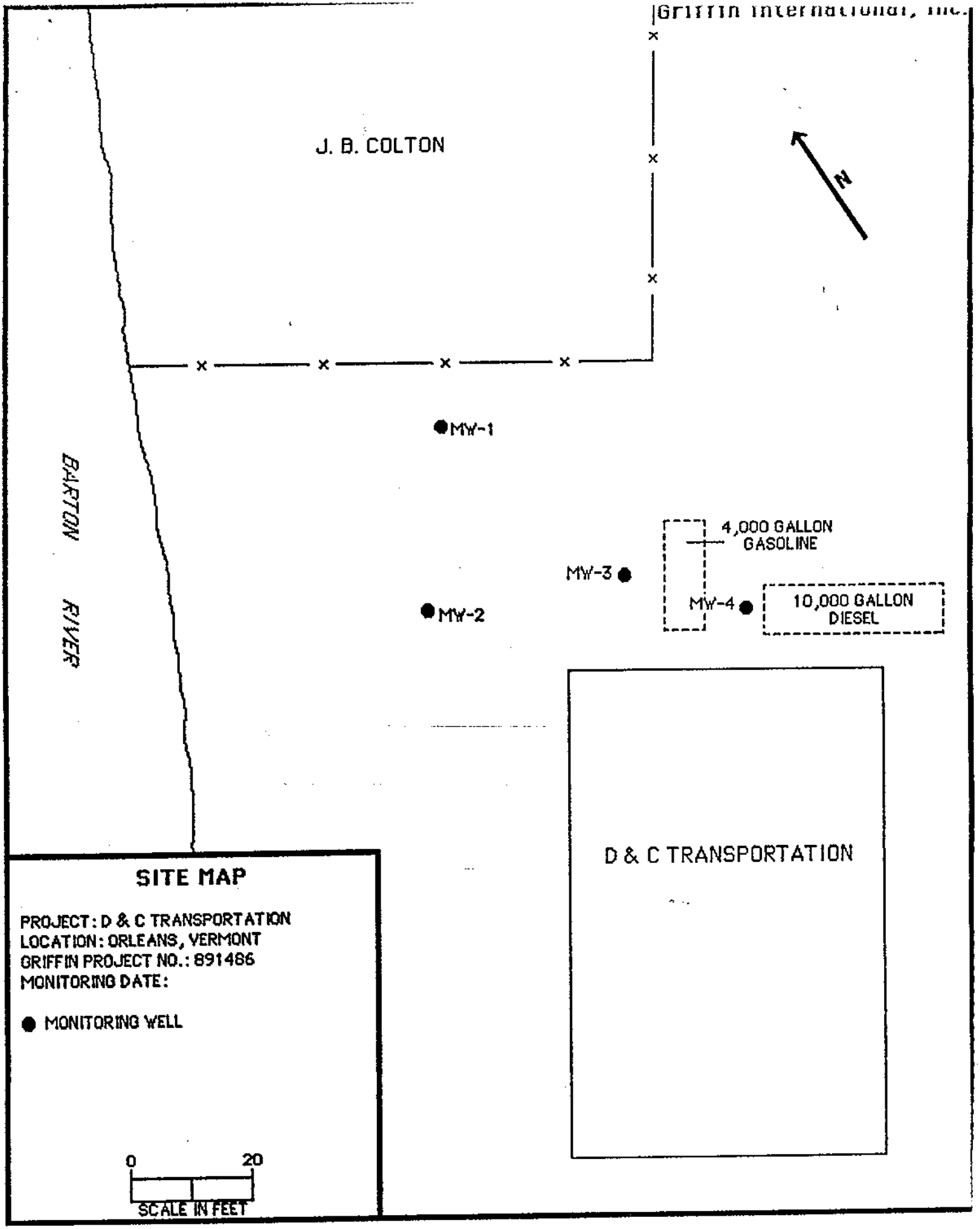


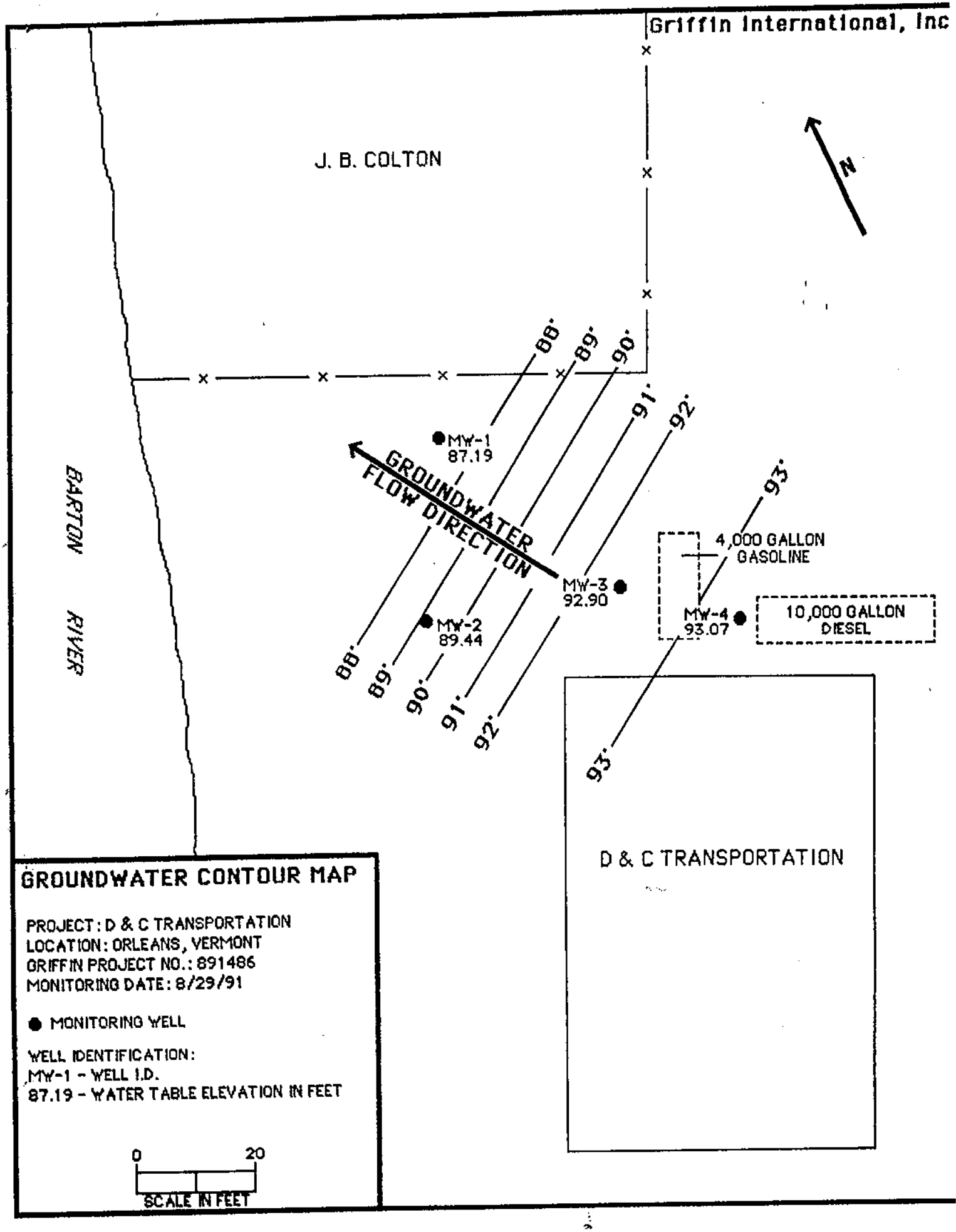
MILEAGE SUMMARY

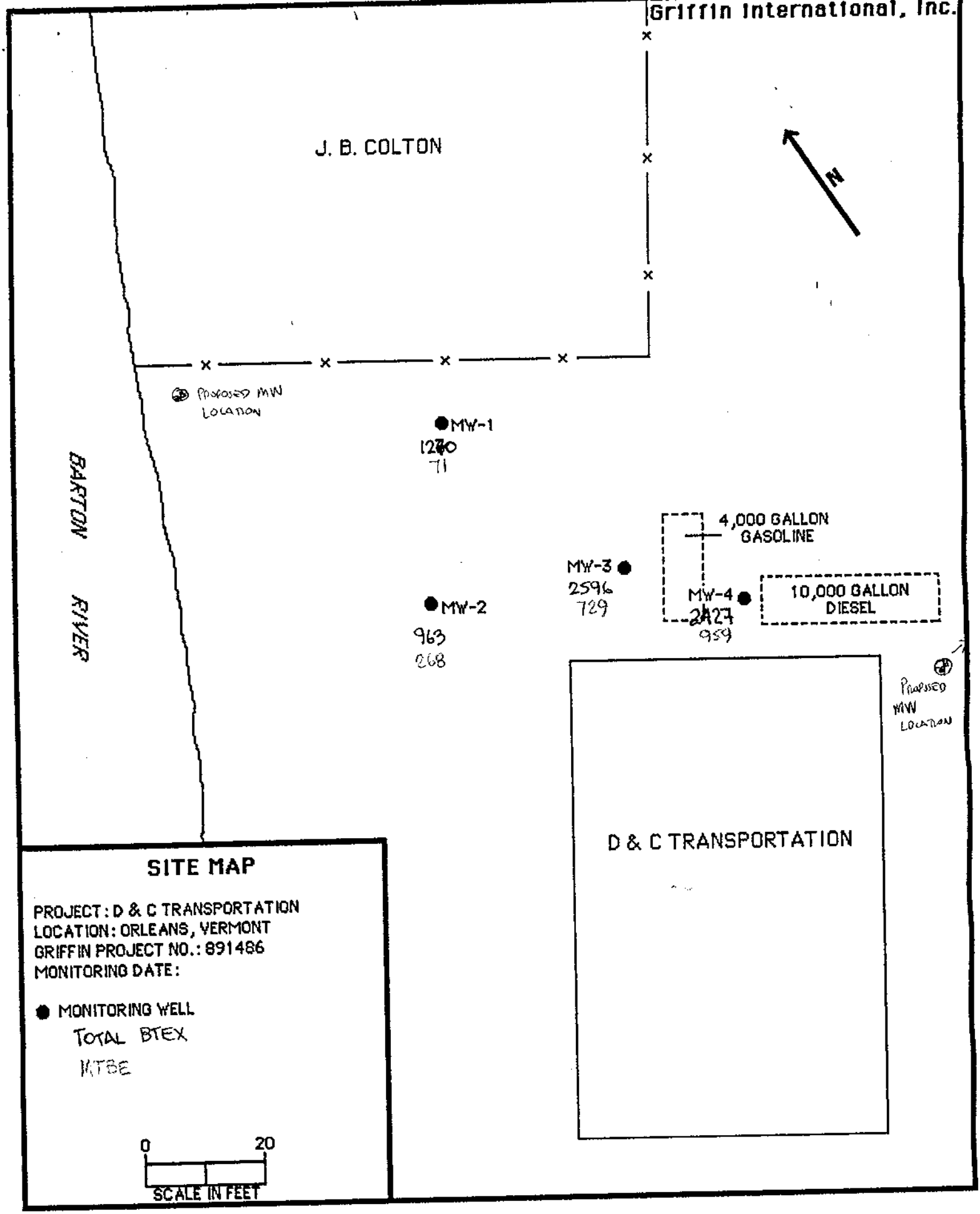
CLASS 1 TOWN HIGHWAYS:			
NO. 1	0.558		
NO.			
TOTAL, CLASS 1 TOWN HWYS.		0.558	
CLASS 2 TOWN HIGHWAYS:			
NO. 2	0.350		
NO. 3	0.578		
NO.			
TOTAL, CLASS 2 TOWN HWYS.		0.928	
CLASS 3 TOWN HIGHWAYS:		4.000	
TOTAL, TOWN HWYS.			5.486
STATE HIGHWAYS:			
INTERSTATE HWY. NO. 91	0.226		
INTERSTATE RAMPS	0.593		
TOTAL, INTERSTATE HWYS.		0.819	
STATE HWY U.S. 5	0.229		
STATE HWY VT. 58	0.710		
STATE HWY.			
TOTAL, NON-INTERSTATE HWYS.		0.939	
TOTAL, STATE HWYS			1.758
TOTAL TRAVELED HWYS., FEB. 10, 1986.			7.244*

* EXCLUDES CLASS 4 MILEAGE

SITE LOCATION MAP
D & C TRANSPORTATION INC.
ORLEANS, VT GRIFFIN INT'L


Griffin International, Inc.
J. B. COLTON
N
BARTON RIVER
MW-1
MW-2
MW-3
MW-4
4,000 GALLON GASOLINE
10,000 GALLON DIESEL
D & C TRANSPORTATION
SITE MAP
PROJECT: D & C TRANSPORTATION
LOCATION: ORLEANS, VERMONT
GRIFFIN PROJECT NO.: 891486
MONITORING DATE:
MONITORING WELL
0
20
SCALE IN FEET


Griffin International, Inc
J. B. COLTON
N
BARTON RIVER
88'
89'
90'
91'
92'
93'
MW-1
87.19
GROUNDWATER
FLOW DIRECTION
MW-2
89.44
MW-3
92.90
MW-4
93.07
4,000 GALLON
GASOLINE
10,000 GALLON
DIESEL
D & C TRANSPORTATION
GROUNDWATER CONTOUR MAP
PROJECT: D & C TRANSPORTATION
LOCATION: ORLEANS, VERMONT
GRIFFIN PROJECT NO.: 891486
MONITORING DATE: 8/29/91
● MONITORING WELL
WELL IDENTIFICATION:
MW-1 - WELL I.D.
87.19 - WATER TABLE ELEVATION IN FEET
0
20
SCALE IN FEET


J. B. COLTON
N
Proposed MW Location
MW-1
1270
71
BARTON RIVER
4,000 GALLON GASOLINE
MW-3
2596
729
MW-4
2427
959
10,000 GALLON DIESEL
MW-2
963
868
Proposed MW Location
D & C TRANSPORTATION
SITE MAP
PROJECT: D & C TRANSPORTATION
LOCATION: ORLEANS, VERMONT
GRIFFIN PROJECT NO.: 891486
MONITORING DATE:
MONITORING WELL
TOTAL BTEX
MTBE
0
20
SCALE IN FEET

APPENDIX B

PROJECT D&C TRANSPORTATION

LOCATION ORLEANS, VERMONT

DATE DRILLED 8/26/91 TOTAL DEPTH OF HOLE 15'

DIAMETER 6"

SCREEN DIA. 2" LENGTH 10' SLOT SIZE .010"

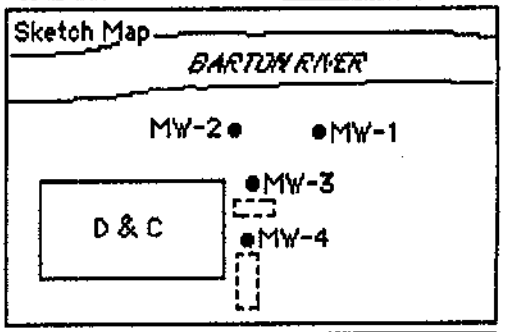
CASING DIA. 2" LENGTH 5' TYPE PVC

DRILLING CO. GREEN MT. BORING DRILLING METHOD HOLLOW STEM AUGER

DRILLER STEVE LAWRENCE LOG BY P. MURRAY

WELL NUMBER MW-1

Sketch Map



DEPTH IN FEET	WELL CONSTRUCTION	NOTES	BLOWS PER 6" OF SPOON	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
0		ROAD BOX		
1		WELL CAP		Silty SAND and GRAVEL fill 0 ppm
2		CONCRETE		
3		WELL CASING		Gray, silty CLAY, little fine sand 0 ppm
4		BENTONITE		
5			5'-7': 4,6,4,4	Dark brown SILT, fine SAND and CLAY 2 ppm
6				
7		WELL SCREEN		
8				
9				
10		GRAVEL PACK	10'-12': 2,3,6,9	Wet, olive green SILT and fine SAND, little clay
11				WATER TABLE ▼
12				0 ppm
13				Wet SILT and very fine SAND 0 ppm
14				
15		BOTTOM PLUG		BASE OF EXPLORATION AT 15'
16				
17				
18				
19				
20				
21				
22				
23				
24				
25				
26				

Griffin International

PROJECT D&C TRANSPORTATION

LOCATION ORLEANG, VERMONT

DATE DRILLED 8/26/91 TOTAL DEPTH OF HOLE 17'

DIAMETER 6"

SCREEN DIA. 2" LENGTH 10' SLOT SIZE .010"

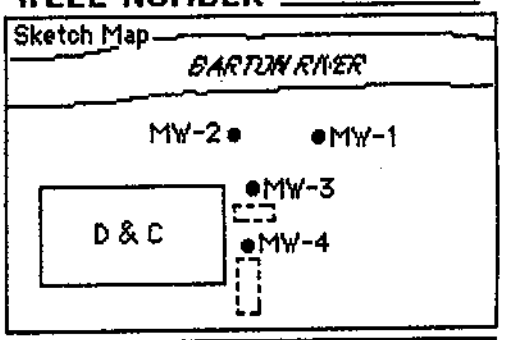
CASING DIA. 2" LENGTH 5.5' TYPE PVC

DRILLING CO. GREEN MT. BORING DRILLING METHOD HOLLOW STEM AUGER

DRILLER STEVE LAWRENCE LOG BY P. MURRAY

WELL NUMBER MW-2

Sketch Map



DEPTH IN FEET	WELL CONSTRUCTION	NOTES	BLOWS PER 6" OF SPOON	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
0–17	ROAD BOX; WELL CAP; CONCRETE; WELL CASING; BENTONITE; WELL SCREEN; GRAVEL PACK; BOTTOM PLUG; NATIVE BACKFILL			
0–1				Black/gray SILT and CLAY, some fine sand 0 ppm
5–7			5'-7': 7,5,5,6	Dark brown SILT and fine SAND, some clay and gravel 0 ppm
9				WATER TABLE
10–11.5			10'-11.5': 3,3,6	10'-10.5': Wet, gray SILT and very fine SAND 0 ppm 10.5'-11.5': Tight, moist, gray CLAY, some silt and sand 0 ppm
14–15				Wet, gray CLAY, some silt, little fine sand 0 ppm
17				BASE OF EXPLORATION AT 17'

Griffin International

PROJECT D&C TRANSPORTATION

LOCATION ORLEANS, VERMONT

DATE DRILLED 8/26/91 TOTAL DEPTH OF HOLE 15'

DIAMETER 6"

SCREEN DIA. 2" LENGTH 10' SLOT SIZE .010"

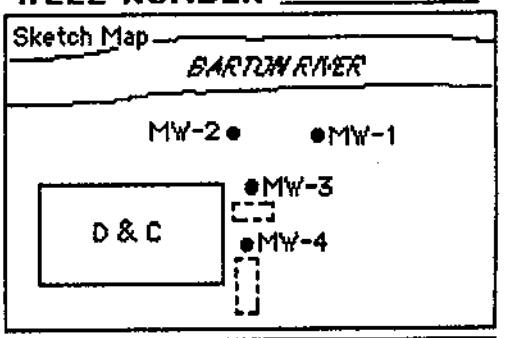
CASING DIA. 2" LENGTH 5' TYPE PVC

DRILLING CO. GREEN MT. BORING DRILLING METHOD HOLLOW STEM AUGER

DRILLER STEVE LAWRENCE LOG BY P. MURRAY

WELL NUMBER MW-3

Sketch Map



DEPTH IN FEET	WELL CONSTRUCTION	NOTES	BLOWS PER 6" OF SPOON	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
0		ROAD BOX		
1		WELL CAP		Black, silty SAND anbd GRAVEL
2		CONCRETE		
3		WELL CASING		
4		BENTONITE		
5			5'-7': 8,2,2,2	Wet, brown, fine, silty SAND 110 ppm
6				
7		WELL SCREEN		WATER TABLE ▼
8				
9				
10		GRAVEL PACK	10'-12': 3,2,2,4	NO SAMPLE RETAINED, SPLIT SPOON PUSHING STONE
11				
12				Fine, wet SAND and SILT UP TO 100 ppm
13				
14				
15		BOTTOM PLUG		BASE OF EXPLORATION AT 15'
16				
17				
18				
19				
20				
21				
22				
23				
24				
25				
26				

Griffin International

PROJECT D&C TRANSPORTATION

LOCATION ORLEANS, VERMONT

DATE DRILLED 8/26/91 TOTAL DEPTH OF HOLE 15'

DIAMETER 6"

SCREEN DIA. 2" LENGTH 10' SLOT SIZE .010"

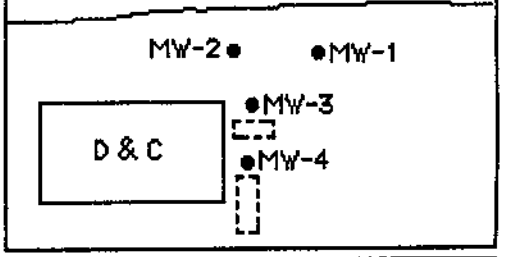
CASING DIA. 2" LENGTH 5' TYPE PVC

DRILLING CO. GREEN MT. BORING DRILLING METHOD HOLLOW STEM AUGER

DRILLER STEVE LAWRENCE LOG BY P. MURRAY

WELL NUMBER MW- 4

Sketch Map



DEPTH IN FEET	WELL CONSTRUCTION	NOTES	BLOWS PER 6" OF SPOON	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
0–1		ROAD BOX WELL CAP CONCRETE		Dark gray, silty SAND, some gravel
2–4		WELL CASING BENTONITE		
5			5'-7': 2,9,11,8	Moist, light brown, fine, silty SAND 115 ppm
7		WELL SCREEN		WATER TABLE ▼
8–9				Dark brown SILT, some sand
10		GRAVEL PACK	10'-12': 1,3,2,3	Wet, silty CLAY, some fine SAND 3 ppm
15		BOTTOM PLUG		BASE OF EXPLORATION AT 15'
16–26				

Griffin International

Green Mountain Boring Co., Inc.

R. D. 2 — BARRE, VERMONT 05641

RECEIVED 1991

SHEET 1 OF 4
DATE 8/26/91
HOLE NO. MW-1
LINE & STA.
OFFSET None

TO Griffin International
PROJECT NAME D & C Transportation
REPORT SENT TO Griffin International
SAMPLES SENT TO Griffin International

ADDRESS Williston, VT
LOCATION Orleans, VT
PROJ. NO.
OUR JOB NO. 91-185

GROUND WATER OBSERVATIONS

At 10' at ½ Hours
At ..... at ..... Hours

	CASING	SAMPLER	CORE BAR.
Type	AUGERS	SPLIT SPOON	
Size I. D.	4.25"	1⅜"	
Hammer Wt.		140#	
Hammer Fall		30"	

SURFACE ELEV.
DATE STARTED 8/26/91
DATE COMPL. 8/26/91
BORING FOREMAN Bernasconi
INSPECTOR
SOILS ENGR.

LOCATION OF BORING: North East of tank pit

DEPTH	Casing Blows per foot	Sample Depths From — To	Type of Sample	Blows per 6" on Sampler From 0-6	6-12	To 12-18	Moisture Density or Consist.	Strata Change Elev.	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc.	SAMPLE No.	Pen	Rec.
		5' - 7'	D	4	6	4	Dry		Sand and silt and clay	1	24"	12"
				4								
		10' - 12'	D	2	3	6	Wet		Fine sand	2	24"	8"
				9								
		15' - 17'	D						Drilled to 15' Set well at 15'			

Materials Used

10' .010 screen
5' riser
25 lbs. bentonite
3 bags of silica sand
1 push on cap
1 wing type cap
½ bag of cement
1 curb box (M-65)

GROUND SURFACE TO 15' USED 4.25" AUGERS: THEN split spoon and set well

Sample Type
D = Dry C = Cored W = Washed
UP = Undisturbed Piston
TP = Test Pit A = Auger V = Vane Test
UT = Undisturbed Thinwall

Proportions Used
trace 0 to 10%
little 10 to 20%
some 20 to 35%
and 35 to 50%

140 lb. Wt. x 30" fall an 2" O. D. Sampler

Cohesionless Density
0-10 Loose
10-30 Med. Dense
30-50 Dense
50 + Very Dense

Cohesive Consistency
0-4 Soft
4-8 M/Stiff
8-15 Stiff
15-30 V-Stiff
30 + Hard

SUMMARY:
Earth Boring 15'
Rock Coring
Samples 2

HOLE NO. MW-1

Green Mountain Boring Co., Inc.

R. D. 2 — BARRE, VERMONT 05641

SHEET 2 OF 4

TO Griffin International ADDRESS Williston, VT

PROJECT NAME D & C Transportation LOCATION Orleans, VT

REPORT SENT TO Griffin International PROJ. NO.

SAMPLES SENT TO Griffin International OUR JOB NO. 91-185

DATE 8/26/91

HOLE NO. MW-2

LINE & STA.

OFFSET None

GROUND WATER OBSERVATIONS

At 10' at ½ Hours

At ..... at ..... Hours

	CASING	SAMPLER	CORE BAR.
Type	AUGERS	SPLIT SPOON	
Size I. D.	4.25"	1⅜"	
Hammer Wt.		140#	
Hammer Fall		30"	

SURFACE ELEV.

DATE STARTED 8/26/91

DATE COMPL. 8/26/91

BORING FOREMAN Bernasconi

INSPECTOR

SOILS ENGR.

LOCATION OF BORING: North West of tank pit

DEPTH	Casing Blows per foot	Sample Depths From — To	Type of Sample	Blows per 6" on Sampler From 0-6	Blows per 6" on Sampler From 6-12	Blows per 6" on Sampler To 12-18	Moisture Density or Consist.	Strata Change Elev.	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc.	SAMPLE No.	SAMPLE Pen	SAMPLE R
		5' - 7'	D	5 6	6	4	Dry		Clay and sand and silt	1	24"	10"
		10' - 12'	D	3	3	6	Moist		Silty sand and layers of clay	2	24"	24"
		15' - 17'	D						Drilled to 15'			
									Set well at 15'			
									Materials Used			
									10' .010 screen 5' riser 3 bags of silica sand 25 lbs. of bentonite 1 push on cap 1 wing type cap 1 curb box (M-65) ½ bag of cement			

GROUND SURFACE TO 15' USED 4.25" AUGERS: THEN split spoon and set well

Sample Type

D = Dry C = Cored W = Washed

UP = Undisturbed Piston

TP = Test Pit A = Auger V = Vane Test

UT = Undisturbed Thinwall

Proportions Used

trace	0 to 10%
little	10 to 20%
some	20 to 35%
and	35 to 50%

140 lb. Wt. x 30" fall an 2" O. D. Sampler

Cohesionless Density

0-10	Loose
10-30	Med. Dense
30-50	Dense
50 +	Very Dense

Cohesive Consistency

0-4	Soft
4-8	M/Stiff
8-15	Stiff
15-30	V-Stiff
30 +	Hard

SUMMARY:

Earth Boring 15'

Rock Coring

Samples 2

HOLE NO. MW-2

Green Mountain Boring Co., Inc.

R. D. 2 – BARRE, VERMONT 05641

SHEET 3 OF 4

TO Griffin International ADDRESS Williston, VT

PROJECT NAME D & C Transportation LOCATION Orleans, VT

REPORT SENT TO Griffin International PROJ. NO.

SAMPLES SENT TO Griffin International OUR JOB NO. 91-185

DATE 8/26/91

HOLE NO. MW-3

LINE & STA.

OFFSET None

GROUND WATER OBSERVATIONS

At 10' at ½ Hours

At ..... at ..... Hours

	CASING	SAMPLER	CORE BAR.
Type	AUGERS	SPLIT SPOON	
Size I. D.	4.25"	1⅜"	
Hammer Wt.		140#	
Hammer Fall		30"	

SURFACE ELEV.

DATE STARTED 8/26/91

DATE COMPL. 8/26/91

BORING FOREMAN Bernasconi

INSPECTOR

SOILS ENGR.

LOCATION OF BORING: North of super unleaded fuel tank

DEPTH	Casing Blows per foot	Sample Depths From – To	Type of Sample	Blows per 6" on Sampler From 0-6	6-12	To 12-18	Moisture Density or Consist.	Strata Change Elev.	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc.	SAMPLE No.	Pen	Rec
		5' - 7'	D	8	2	2	Dry/		Silty sand	1	24"	18"
				2			WET					
		10' - 12'	D	3	2	2	Wet		Silty sand	2	24"	
				4								
									Drilled to 15'			
									Set well at 15'			
									Materials Used			
									10' .010 screen			
									5' riser			
									4 bags of silica sand			
									25 lbs. bentonite			
									1 push on cap			
									1 wing type cap			
									1 curb box (M-65)			

GROUND SURFACE TO 15' USED 4.25" AUGERS: THEN split spoon and set well

Sample Type
D = Dry C = Cored W = Washed
UP = Undisturbed Piston
TP = Test Pit A = Auger V = Vane Test
UT = Undisturbed Thinwall

Proportions Used
trace 0 to 10%
little 10 to 20%
some 20 to 35%
and 35 to 50%

140 lb. Wt. x 30" fall an 2" O. D. Sampler
Cohesionless Density
0-10 Loose
10-30 Med. Dense
30-50 Dense
50 + Very Dense

Cohesive Consistency
0-4 Soft 30 + Hard
4-8 M/Stiff
8-15 Stiff
15-30 V-Stiff

SUMMARY:
Earth Boring 15'
Rock Coring
Samples 2

HOLE NO MW-3

Green Mountain Boring Co., Inc.

R. D. 2 — BARRE, VERMONT 05641

SHEET 4 OF 4
DATE 8/26/91
HOLE NO. MW-4
LINE & STA.
OFFSET None

TO Griffin International ADDRESS Williston, VT
PROJECT NAME D & C Transportation LOCATION Orleans, VT
REPORT SENT TO Griffin International PROJ. NO.
SAMPLES SENT TO Griffin International OUR JOB NO. 91-185

GROUND WATER OBSERVATIONS

At 10' at ½ Hours

At ..... at ..... Hours

	CASING	SAMPLER	CORE BAR.
Type	AUGERS	SPLIT SPOON	
Size I. D.	4.25"	1⅜"	
Hammer Wt.		140#	
Hammer Fall		30"	

SURFACE ELEV.
DATE STARTED 8/26/91
DATE COMPL. 8/26/91
BORING FOREMAN Bernasconi
INSPECTOR
SOILS ENGR.

LOCATION OF BORING: Between Tanks

DEPTH	Casing Blows per foot	Sample Depths From — To	Type of Sample	Blows per 6" on Sampler From 0-6	6-12	To 12-18	Moisture Density or Consist.	Strata Change Elev.	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc.	SAMPLE No.	Pen	Rec
		5' - 7'	D	2	9	11	Dry		Silty sand	1	24"	24"
				8								
		10' - 12'	D	1	3	2	Wet		Grey clay and sand layers	2	24"	24"
				3								
									Drilled to 15'			
									Set well at 15'			
									Materials Used			
									10' .010 screen			
									5' riser			
									3 bags of silica sand			
									25 lbs. of bentonite			
									1 wing cap			
									1 push on cap			
									1 curb box (M-65)			
									½ bag of cement			

GROUND SURFACE TO 15' USED 4.25" AUGERS: THEN split spoon

Sample Type
D = Dry C = Cored W = Washed
UP = Undisturbed Piston
TP = Test Pit A = Auger V = Vane Test
UT = Undisturbed Thinwall

Proportions Used
trace 0 to 10%
little 10 to 20%
some 20 to 35%
and 35 to 50%

140 lb. Wt. x 30" fall on 2" O. D. Sampler

Cohesionless Density
0-10 Loose
10-30 Med. Dense
30-50 Dense
50 + Very Dense

Cohesive Consistency
0-4 Soft
4-8 M/Stiff
8-15 Stiff
15-30 V-Stiff
30 + Hard

SUMMARY:
Earth Boring 15'
Rock Coring
Samples 2

HOLE NO MW-4

APPENDIX C

LIQUID LEVEL MONITORING DATA

PROJECT: D & C TRANSPORTATION #891486

LOCATION: ORLEANS, VT

DATE: THURSDAY 8/29/91

WELL I.D.	WELL DEPTH	TOP OF CASING ELEVATION	DEPTH TO PRODUCT	DEPTH TO WATER	PRODUCT THICKNESS	SPECIFIC GRAVITY OF PRODUCT	HYDRO EQUIVALENT	CORRECTED DEPTH TO WATER	CORRECTED WATER TABLE ELEVATION
MW1	15'	98.19		11.00					87.19
MW2	15.5'	98.38		8.94					89.44
MW3	15'	99.81		6.91					92.90
MW4	15'	100.00		6.93					93.07

COMMENTS:

Griffin International

LIQUID LEVEL MONITORING DATA

PROJECT: D & C TRANSPORTATION #891486

LOCATION: ORLEANS, UT

DATE: TUESDAY 8/29/91

WELL I.D.	WELL DEPTH	TOP OF CASING ELEVATION	DEPTH TO PRODUCT	DEPTH TO WATER	PRODUCT THICKNESS	SPECIFIC GRAVITY OF PRODUCT	HYDRO EQUIVALENT	CORRECTED DEPTH TO WATER	CORRECTED WATER TABLE ELEVATION
mw1	15'	98.19		11.00					87.19
mw2	15.5'	98.38		8.94					89.44
mw3	15'	99.81		6.91					92.90
mw4	15'	100.00		6.93					93.07

COMMENTS:

Griffin International

APPENDIX D

ENDYNE, INC.

Laboratory Services

32 James Brown Drive
Williston, Vermont 05495
(802) 879-4333
FAX 879-7103

RECEIVED SEP 2 0 1991

LABORATORY REPORT

EPA METHOD 602 -- PURGEABLE AROMATICS

CLIENT: Griffin International
PROJECT NAME: D & C Transportation
REPORT DATE: September 18, 1991
SAMPLER: Don Tourangeau
DATE SAMPLED: August 29, 1991
DATE RECEIVED: August 29, 1991

ANALYSIS DATE: September 13, 1991
STATION: Trip Blank
REF.#: 23,259
TIME SAMPLED: 09:25

Parameter	Minimum Detection Limit	Concentration (ug/L)
Benzene	2.	ND[1]
Chlorobenzene	1.	ND
1,2-Dichlorobenzene	2.	ND
1,3-Dichlorobenzene	2.	ND
1,4-Dichlorobenzene	2.	ND
Ethylbenzene	1.	ND
Toluene	1.	ND
Xylenes	5.	ND
MTBE	1.	ND

NUMBER OF UNIDENTIFIED PEAKS FOUND: 0

NOTES:

1 None detected

Reviewed by _____

ENDYNE, INC.

Laboratory Services

32 James Brown Drive
Williston, Vermont 05495
(802) 879-4333
FAX 879-7103

LABORATORY REPORT

EPA METHOD 602 -- PURGEABLE AROMATICS

CLIENT: Griffin International
PROJECT NAME: D & C Transportation
REPORT DATE: September 18, 1991
SAMPLER: Don Tourangeau
DATE SAMPLED: August 29, 1991
DATE RECEIVED: August 29, 1991

ANALYSIS DATE: September 13, 1991
STATION: MW #1
REF.#: 23,260
TIME SAMPLED: 12:35

Parameter	Minimum Detection Limit	Concentration (ug/L)
Benzene	2.	360.
Chlorobenzene	1.	6.07
1,2-Dichlorobenzene	2.	ND[1]
1,3-Dichlorobenzene	2.	ND
1,4-Dichlorobenzene	2.	ND
Ethylbenzene	1.	192.
Toluene	1.	32.5
Xylenes	5.	679.
MTBE	1.	71.0

NUMBER OF UNIDENTIFIED PEAKS FOUND: 25

NOTES:

1 None detected

Reviewed by _____

ENDYNE, INC.

Laboratory Services

32 James Brown Drive
Williston, Vermont 05495
(802) 879-4333
FAX 879-7103

LABORATORY REPORT

EPA METHOD 602 -- PURGEABLE AROMATICS

CLIENT: Griffin International
PROJECT NAME: D & C Transportation
REPORT DATE: September 18, 1991
SAMPLER: Don Tourangeau
DATE SAMPLED: August 29, 1991
DATE RECEIVED: August 29, 1991

ANALYSIS DATE: September 13, 1991
STATION: MW #2
REF.#: 23,261
TIME SAMPLED: 12:50

Parameter	Minimum Detection Limit	Concentration (ug/L)
Benzene	2.	385.
Chlorobenzene	1.	ND[1]
1,2-Dichlorobenzene	2.	ND
1,3-Dichlorobenzene	2.	ND
1,4-Dichlorobenzene	2.	ND
Ethylbenzene	1.	69.0
Toluene	1.	208.
Xylenes	5.	301.
MTBE	1.	268.

NUMBER OF UNIDENTIFIED PEAKS FOUND: 2

NOTES:

1 None detected

Reviewed by _____

ENDYNE, INC.

Laboratory Services

32 James Brown Drive
Williston, Vermont 05495
(802) 879-4333
FAX 879-7103

LABORATORY REPORT

EPA METHOD 602 -- PURGEABLE AROMATICS

CLIENT: Griffin International
PROJECT NAME: D & C Transportation
REPORT DATE: September 18, 1991
SAMPLER: Don Tourangeau
DATE SAMPLED: August 29, 1991
DATE RECEIVED: August 29, 1991

ANALYSIS DATE: September 13, 1991
STATION: MW #3
REF.#: 23,262
TIME SAMPLED: 13:20

Parameter	Minimum Detection Limit	Concentration (ug/L)
Benzene	2.	875.
Chlorobenzene	1.	ND[1]
1,2-Dichlorobenzene	2.	ND
1,3-Dichlorobenzene	2.	ND
1,4-Dichlorobenzene	2.	ND
Ethylbenzene	1.	213.
Toluene	1.	468.
Xylenes	5.	1,040.
MTBE	1.	729.

NUMBER OF UNIDENTIFIED PEAKS FOUND: 18

NOTES:

1 None detected

Reviewed by _____

ENDYNE, INC.

Laboratory Services

32 James Brown Drive
Williston, Vermont 05495
(802) 879-4333
FAX 879-7103

LABORATORY REPORT

EPA METHOD 602 -- PURGEABLE AROMATICS

CLIENT: Griffin International
PROJECT NAME: D & C Transportation
REPORT DATE: September 18, 1991
SAMPLER: Don Tourangeau
DATE SAMPLED: August 29, 1991
DATE RECEIVED: August 29, 1991

ANALYSIS DATE: September 13, 1991
STATION: MW #4
REF.#: 23,263
TIME SAMPLED: 13:42

Parameter	Minimum Detection Limit	Concentration (ug/L)
Benzene	2.	765.
Chlorobenzene	1.	11.8
1,2-Dichlorobenzene	2.	2.19
1,3-Dichlorobenzene	2.	ND[1]
1,4-Dichlorobenzene	2.	ND
Ethylbenzene	1.	217.
Toluene	1.	435.
Xylenes	5.	1,010.
MTBE	1.	959.

NUMBER OF UNIDENTIFIED PEAKS FOUND: 18

NOTES:

1 None detected

Reviewed by _____

ENDYNE, INC.

Laboratory Services

32 James Brown Drive
Williston, Vermont 05495
(802) 879-4333
FAX 879-7103

LABORATORY REPORT

EPA METHOD 602 -- PURGEABLE AROMATICS

CLIENT: Griffin International
PROJECT NAME: D & C Transportation
REPORT DATE: September 18, 1991
SAMPLER: Don Tourangeau
DATE SAMPLED: August 29, 1991
DATE RECEIVED: August 29, 1991

ANALYSIS DATE: September 13, 1991
STATION: MW #5
REF.#: 23,264
TIME SAMPLED: Not Indicated

Parameter	Minimum Detection Limit	Concentration (ug/L)
Benzene	2.	870.
Chlorobenzene	1.	TBQ[2]
1,2-Dichlorobenzene	2.	ND[1]
1,3-Dichlorobenzene	2.	ND
1,4-Dichlorobenzene	2.	ND
Ethylbenzene	1.	200.
Toluene	1.	468.
Xylenes	5.	1,020.
MTBE	1.	700.

NUMBER OF UNIDENTIFIED PEAKS FOUND: 18

NOTES:

1 None detected
2 Trace below quantitation limits

Reviewed by _____

ENDYNE, INC.

Laboratory Services

32 James Brown Drive
Williston, Vermont 05495
(802) 879-4333
FAX 879-7103

LABORATORY REPORT

EPA METHOD 602 -- PURGEABLE AROMATICS

CLIENT: Griffin International
PROJECT NAME: D & C Transportation
REPORT DATE: September 18, 1991
SAMPLER: Don Tourangeau
DATE SAMPLED: August 29, 1991
DATE RECEIVED: August 29, 1991

ANALYSIS DATE: September 13, 1991
STATION: Site Blank
REF.#: 23,265
TIME SAMPLED: 13:50

Parameter	Minimum Detection Limit	Concentration (ug/L)
Benzene	2.	ND[1]
Chlorobenzene	1.	ND
1,2-Dichlorobenzene	2.	ND
1,3-Dichlorobenzene	2.	ND
1,4-Dichlorobenzene	2.	ND
Ethylbenzene	1.	ND
Toluene	1.	ND
Xylenes	5.	ND
MTBE	1.	ND

NUMBER OF UNIDENTIFIED PEAKS FOUND: 0

NOTES:

1 None detected

Reviewed by _____